

5. 다음 정적분을 구하라

$$\int_0^{\sqrt{3}} x\sqrt{x^2+2} \, dx$$

$$= \int_2^5 \frac{\sqrt{t}}{2} \, dt$$

$$= \frac{1}{2} \int_2^5 \sqrt{t} \, dt$$

$$= \frac{1}{2} \left[\frac{2}{3} t^{\frac{3}{2}} \right]_2^5$$

$$= \frac{1}{2} \cdot \frac{2}{3} \left(5^{\frac{3}{2}} - 2^{\frac{3}{2}} \right)$$

$$= \frac{1}{3} (5\sqrt{5} - 2\sqrt{2})$$

$$\begin{aligned} x^2+2 &= t \Rightarrow \begin{cases} x=\sqrt{3} \Rightarrow t=5 \\ x=0 \Rightarrow t=2 \end{cases} \\ 2x &= \frac{dt}{dx} \end{aligned}$$

$$\boxed{x \, dx} = \frac{dt}{2}$$